Description:

Method for billing a service in a packet data network

5   The invention relates to a method for billing a service in a
packet data network and a billing system provided for carrying
out the method according to the invention.

In a packet data network, for example the Internet, a multitude
10   of services is offered. Examples of this are, for instance, the
transmission of music and video contents or also Internet
telephony as well as the downloading of so-called Internet
pages in HTML format. As a rule, a user is granted this access
by a so-called Internet provider. Billing takes place, for
15   example at a fixed price specified for a particular period, for
instance a "flat rate" to be paid monthly, independently of the
actual utilization of the Internet. It is also conceivable that
billing is made dependent on the actual utilization. In this
context, the access must be paid for, for example, per minute.
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According to the prior art, systems are also known which limit
the access to the Internet. In this context, access is granted,
for example, only to a particular type of services. In this
context, the downloading of music and videos can be prohibited
25   but the downloading of Internet pages can be allowed.

In this context, access is made possible for a user via an
access router, a so-called "edge router", in connection with a
service
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selection system, a so-called "service selection portal". During the dialing into the Internet, the service selection portal is informed by the edge router about the dialing process for this purpose. The service selection portal then determines

5   what services are available for the user and, for example, an HTML page with a corresponding listing is transferred to the user, which also enables a service to be selected. After the selection by the user, the edge router is instructed by the service selection portal to enable the required connection for

10   the utilization of the service.

In this arrangement, the Internet provider determines, for example in dependence on a billing model, what services should be available in principle. The provider can offer various

15   service packets at different prices so that, for example, linear downloading of Internet pages is offered more inexpensively than the utilization of all services possible on the Internet. Billing is again at a flat rate or time-dependent.

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In this arrangement, it is unsatisfactory both for the user and for the service provider that the billing of a service packet does not differentiate between whether and for how long a service, which may be expensive with regard to the required

25   bandwidth, like the downloading of a video film, is actually used. This means that the user must also pay for the mere possibility of utilization of this service even if he does not use a particular service during an accounting period.

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It is, therefore, the object of the invention to specify a method and a device which improve the billing of a service in a packet data network.

5   This object is achieved by means of a method of the type initially mentioned
    -   in which at least two billing types are allocated to a
        service and in which, when the service is utilized, data
        on the utilization of the service and a billing type
10   selected by the user are stored, or
    -   in which a number of usable services are allocated to a
        user to which in each case at least one billing type is
        allocated and in which, when the service selected by the
        user is utilized, data on the type and utilization of the
15   service and a billing type allocated to the service or a
        billing type selected by the user are stored.

In the first variant of the invention, two or more billing types are allocated to a service. It is also conceivable that 20 the downloading of a video film is billed overall per film, per data volume transmitted or, for example, in accordance with the transmission time. It is also conceivable that various transmission rates are offered for this which are also billed differently. Thus, the user has the possibility here of 25 selecting a charge model suitable for him.

In the second variant, a number of services are offered for utilization which are, in each case, allocated at least one charge type. Thus, the user can decide here whether he wishes 30 to use relatively expensive services or not. In this arrangement, a number of charge types can again be allocated to a service,

for example high and expensive transmission bandwidths or low and inexpensive transmission bandwidths.

Compared with the prior art, the users' satisfaction can thus
5   be improved considerably.

In this context, it is advantageous
-       if, during the registration of the user in the packet data network, the services usable by a user are transmitted by
10   a service selection portal to a billing system,
-       if these services are linked in the billing system with billing types, the allocation of which to the services are stored in the billing system, and
-       if from this a selection list containing the usable
15   services and their billing types is generated and transmitted to the user terminal.

In this arrangement, a service selection portal according to the prior art is advantageously tied into the inventive method,
20 which is why the latter can be implemented with comparatively little expenditure.

During the dialing into the packet data network, the service selection portal determines what services are available for the
25 user. As a consequence, however, no listing of the services is transmitted to the user terminal as in the prior art, but instead the services are first linked with the billing types, the allocation to the services of which are stored in the billing system, still in the billing system. As a result, it is
30 possible to offer the user a service-dependent billing.

An advantageous variant of the invention is given by means of a method

- in which the service selection portal receives from the billing system information on which service has been

5   selected, and

- in which the service selection portal thereupon instructs an edge router to enable the connections required for the service.

10   As already mentioned, a listing of the services which also enables a service to be selected is transmitted to the user terminal. As a consequence, the choice of the user is transmitted via the service selection portal to the billing system, where it is evaluated. Finally, the edge router is

15   instructed by the service selection portal to enable the required connection for the utilization of the service. Due to this tying of the invention into a system known from the prior art, comfortable operation by the user also remains ensured.

20   It is advantageous if information on a billing type allocated to the service or selected by the user is stored in the service selection portal.

The information mentioned is advantageously stored here in

25   order to be able to access it again at a later time, for example for accounting purposes.

It is also advantageous

- if the data relevant to the network access are registered

30   by the access server and forwarded to the billing system,

-      if the data obtained are linked there with the billing
        type allocated to the selected service or selected by the
        user, and
-      if a billing record resulting from the linking is stored
5   in the billing system.

According to the prior art, the data relevant to the network
access, such as, for example, access time, duration and
transmission bandwidth used, are registered by the access
10 server. According to the invention, these data are then
forwarded to the billing system where they are linked with the
billing type allocated to the selected service or selected by
the user and a corresponding billing record is stored. Thus, a
service-dependent billing can be advantageously implemented in
15 a simple manner.

It is also particularly advantageous
-      if user-specific data are read out of the access server by
        the billing system
20 -   if the data obtained are linked in the billing system with
        the billing records stored therein, a bill is generated
        therefrom and this is transmitted to the user terminal.

In this manner, the user has access to a current account of the
25 costs incurred by him. This is thus no longer tied to
accounting periods which are predetermined, for example by the
operator of the packet data network.

The object of the invention is also achieved by means of a
30 billing system for billing a service in a packet data network

- in which it comprises means for allocating at least two
billing types to a service and means for storing data
about the utilization of the service and a billing type
selected by the user, or

5 - in which it comprises means for allocating in each case at
least one billing type to a number of services usable by a
user and means for storing data about the type and
utilization of the service and a billing type allocated to
the service or selected by the user.

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The advantages listed in the method according to the invention
similarly also apply to the billing system according to the
invention. A corresponding possibility of selection of a
billing model by the user thus makes it possible to
15 considerably improve the satisfaction of the latter compared
with the prior art.

In this context, it is advantageous
- if it comprises means for receiving the services usable by
20 a user from a service selection portal,
- if it comprises means for linking these services with
billing types, the allocations of which to the services
are stored in the billing system,
- if it comprises means for generating from this linkage a
25 selection list which contains services and their billing,
and
- if it comprises means for sending this selection list to
the user terminal.

30 In this arrangement, the billing system is advantageously tied
into an arrangement known from the prior art.

This comprises means for linking available services with predefined billing types, means for generating a selection list which contains services and their billing types, and means for sending this selection list to the user terminal. A selection
5 list according to the prior art is, therefore, advantageously extended by a billing type allocated to each service by the billing system according to the invention.

An advantageous variant of the invention is also given with a
10 billing system
   -    which comprises means for receiving the data relevant to the network access,
   -    which comprises means for linking the data obtained with the billing type allocated to the selected service or
15   selected by the user, and
   -    in which means exist for storing a billing record resulting from the linkage.

According to the prior art, the data relevant to the network
20 access, such as, for example, access time, duration and transmission bandwidth used, are registered by the access server. The billing system according to the invention then comprises means for receiving and linking these data with a billing type and means for storing a corresponding billing
25 record. In this manner, a billing system for service-dependent billing can be implemented with comparatively little technical expenditure.

It is particularly advantageous
30 -   if the billing system comprises means for receiving user-specific data,

-       if the billing system comprises means for linking the data
        obtained with the stored billing records,
-       if the billing system comprises means for generating a
        bill from these data and
5   -   if the billing system comprises means for sending this
        bill to the user terminal.

This billing system enables a user for the first time to access
a current account of the costs incurred by him. He is thus no
10 longer tied to accounting periods predetermined by the operator
of the packet data network.

The invention will be explained in greater detail with
reference to an exemplary embodiment shown in the figures,
15 which relates to the billing of services in a packet data
network according to the invention.

In the figures:
figure 1   shows how the billing system VS according to the
20   invention is tied into a packet data network PDN;
figure 2   shows the registration of the user in the packet data
           network PDN;
figure 3   shows the method in storing the billing data;
figure 4   shows the user's inquiry regarding his current bill.
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Figure 1 shows how the billing system VS according to the
invention is tied into a packet data network PDN. The figure
comprises a user terminal BE, an edge router ZR, an access
server ZS, a service selection portal DAS and the billing
30 system VS. The latter comprises a selection

device AE, an administrative device VE and a storage device SE.
In the example shown, the user terminal BE is connected via the
edge router ZR to the packet data network PDN which connects
the edge router ZR, the access server ZS, the service selection
5   portal DAS and billing system VS and other devices, not shown,
with one another. Examples of this are devices of service
providers which the user wishes to access.

The operation of the arrangement shown in figure 1 is as
10   follows, the connections between the individual devices not
being shown in the subsequent figures 2 to 4, for the sake of
better clarity, but only the method steps being entered.

Figure 2 shows the registration of the user in the packet data
15   network PDN. In a first step 1, the user is authenticated in
the access server. If he is recognized, user-specific
information is communicated in a second step 2 to the service
selection portal DAS, from where it is forwarded, together with
the services usable by the user, to the selection device AE of
20   the billing system VS in a third step 3. In a fourth step 4,
the billing types allocated to the services are transmitted
from the administrative device VE to the selection device AE
where the information obtained in steps 3 and 4 is linked, a
selection list is generated and the latter is sent to the user
25   terminal BE in a fifth step 5. The selection made by the user
is sent back to the selection device AE in a sixth step 6, the
relevant data like the billing type

allocated to the selected service or a billing type selected by the user being stored. In a seventh step 7, the selected service is then communicated to the service selection portal DAS which finally instructs the edge router ZR in a eighth step
5 8 to enable the connections required for the selected service as a result of which the user is granted access to the desired service.

From figure 3, it can then be seen how the billing data are
10 stored. In this arrangement, the data relevant to the network access, such as, for example, bandwidth and access duration, are registered by the access server ZS and forwarded to the administrative device VE in a first step 1. The data obtained are linked there with the billing type allocated to the
15 selected service or selected by the user and the result is transferred into the storage device SE in a second step 2. These data can also be forwarded in a suitable format to third parties which need these data, for example for accounting purposes, if required.
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In this context, the access server ZS is also known by the term "Authorization, Authentication and Accounting Server", AAA server for short. In this respect, see also:

-   RFC 2903, Experimental, "Generic AAA Architecture",
25   C. de Laat, G. Gross, L. Gommans, J. Vollbrecht, D. Spence, August 2000;
-   RFC 2904, Informational, "AAA Authorization Framework" J. Vollbrecht, P. Calhoun, S. Farrell, L. Gommans, G. Gross, B. de Bruijn, C. de Laat, M. Holdrege, D. Spence, August
30   2000;
-   RFC 2905, Informational, "AAA Authorization Application Examples" J. Vollbrecht, P. Calhoun, S. Farrell, L. Gommans,

G. Gross, B. de Bruijn, C. de Laat, M. Holdrege, D. Spence, August 2000 and

- RFC 2906, Informational, "AAA Authorization Requirements" S. Farrell, J. Vollbrecht, P. Calhoun, L. Gommans, G. Gross,
5   B. de Bruijn, C. de Laat, M. Holdrege, D. Spence, August 2000

A protocol used for communicating with the AAA server is known by the name "Remote Authentication Dial In User Service", or
10 RADIUS for short. In this respect see also:
- RFC 2865, "Remote Authentication Dial In User Service (RADIUS), by C. Rigney, S. Willens, A. Rubens, W. Simpson. June 2000 and
- RFC 2869, "RADIUS Extensions", by C. Rigney, W. Willats,
15   P. Calhoun. June 2000.

A further protocol which is suitable for communication with the AAA server is the so-called "Lightweight Directory Access Protocol", called LDAP for short. In this regard, see also
20 RFC 2251, "Lightweight Directory Access Protocol" by M. Wahl, T. Howes, S. Kille, December 1997.

Figure 4, finally, shows the user's inquiry regarding his current bill. For this purpose, a corresponding request is made
25 to the administrative device VE in a first step 1. In a second step 2, user-specific information is then read out of the access server ZS and transferred to the administrative device VE in order to be able to take into consideration also any active connection into the packet data network PDN for the
30 account. Following this, the charge data stored in the storage device SE are transferred in a third step 3 to the administrative device

VE. The information obtained from the second and third step 2 and 3 are combined there, a bill is generated from this and is transmitted in a fourth step 4 to the user terminal BE where it is displayed.

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